



# PATENT SPECIFICATION

Application Date: Sept. 23, 1921. No. 25,258/21.

169,458

Complete Accepted: Jan. 23, 1923.

## COMPLETE SPECIFICATION.

### Improvements in and relating to Apparatus for Separating Suspended Particles from Vapours and Gases.

I, JOHN GRAY, of Crown House, Aldwych, London, W.C. 2, a British subject, do hereby declare the nature of this invention (a communication from  
5 Deutsche Luftfilter - Bangesellschaft m.b.H., of 30, Dorotheenstrasse, Berlin, N.W., Germany, a German company, and in what manner the same is to be performed, to be particularly described and  
10 ascertained in and by the following statement:—

The present invention relates to filtering apparatus for separating suspended  
15 particles from gases, such as air, or vapours. Filtering apparatus of this kind as previously known has had the disadvantage that the principal parts constituting the surfaces on which the  
20 suspended matter was deposited either in some cases consisted of many elements which were clumsy to handle and were apt to produce variation in the working effects during operation owing to restriction of the effective spaces through which  
25 the gas flowed resulting from vibration, without any possibility of avoiding this disadvantageous restriction during operation; or in other cases the constituent parts while few in number did not constitute a simple structure when assembled.

The apparatus in accordance with the present invention avoids the disadvantages of both these modes of construction  
35 and the filtering surfaces are constituted by longitudinal series of simple like unitary elements.

A filter apparatus according to the present invention comprises a plurality of  
40 corrugated baffle plates arranged in staggered relation to one another, one side wall of each corrugation being perforated so that the gas or vapour which is to be treated flows through the perforations and striking the other side wall of  
45 the corrugation, deposits the suspended matter within the trough of the corruga-

tion. These baffle plates may be assembled in a frame to form an unitary structure, as many frames as desired being then joined together to form the  
50 complete apparatus. The plates may have extensions at their ends so designed as to ensure their assemblage in the correct sequence. Distance rings may also be provided which serve to hold the  
55 plates in position and prevent vibration. The baffle plates may have a cross-section consisting of successive triangles, trapeziums, rectangles of desired shape or may be in the form of waves or other figures,  
60 which pass into one another with a sharp or rounded outline, but the particular shape used forms no part of the present invention.

Baffle plates formed as aforesaid are  
65 therefore each constituted by a single element of simple construction and of standard size, which can readily be handled in the assembly and dismounting and be easily and quickly cleaned.

In order that the invention may be clearly understood and readily carried  
70 into effect, some examples of the same will now be more fully described with reference to the accompanying drawings 75 in which:—

Figure 1 is a front view of an apparatus embodying the features of the present invention.

Figure 2 is a cross section through the  
80 apparatus on the line A—B in Figure 1;

Figure 3 is a cross section to a larger scale through a part of one of the baffle plates inserted in the frame.

Figure 4 is a perspective view of a part  
85 of such a plate;

Figures 5 and 6 are cross-sections through other forms of baffle plates.

Figure 7 is a cross-section to a larger scale than Figures 1 and 2 through a  
90 frame with five plates of the kind shown in Figures 3 and 4 and;

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AMENDMENT - SEE LAST PAGE

Figure 8 is a front view to a smaller scale than Figure 7 showing two frames arranged side by side.

With reference more particularly to Figures 1 and 2, the rectangular frames 2 are constructed of sheet metal or other light material. In each frame 2 a number of baffle plates 3 are arranged in succession in the direction of the flow. The number of these elements depends upon the effect to be produced and upon the requirements in operation. In the examples illustrated it is assumed that five such elements or plates are inserted in each frame.

The shape of the plates 3 is shown by way of examples in Figures 3 to 6. In the plates, which are preferably of sheet metal, channels 7 are formed which open alternately on opposite sides of the plate. The walls of each channel are marked 5 and 6. The walls 5 are impinging surfaces and the walls 6 are constituted by portions of the plate connecting the surfaces 5. In the plate shown in Figures 3 and 4, the channels have approximately a square shape in cross-section while in Figure 5, they are of trapezium shape and in Figure 6, they are made triangular. They might, however, have other shapes than those illustrated. 9 are openings of restricted cross-sectional area which are provided at intervals in the walls 6 so that the medium under treatment is directed in streams upon the surfaces 5. These openings are preferably made in the form of round holes; they can, however, also be made, for example, in the form of slots. The arrangement of a large number of round holes is, however, particularly advantageous as a simple mode of favourably sub-dividing the current.

In Figure 7, there is illustrated, an arrangement of the plates in Figures 3 and 4 which has proved to be particularly effective. According to this arrangement, the plates are spaced apart by distance pieces and so inserted across the general direction of flow, as shown by the arrow  $x$ , that the plates are in staggered relation with one another. The distance pieces help to support the plates, and prevent undue vibration.

The two channels 7 facing one another constitute enlarged chambers which the medium under treatment can enter and leave only through passages of restricted cross-sectional area. As shown by the arrow  $x$ , the direction of the current is constantly being diverted from the general direction of flow while the velocity of the current is constantly varied, being raised as it enters and leaves the chambers before impinging on the

walls 5. "Dead areas" are thus left which favour the deposit of the matter to be separated. The plates are preferably arranged so that the channels lie horizontally. This arrangement of the channels is particularly advantageous if the plates are to be sprinkled with a moistening liquid so that the particles to be separated are retained more effectively.

The frames 2 and baffle plates 3 are advantageously made of a standard size so as to be interchangeable, and the frames 2 may, as shown in Figs. 1, 2 and 8, form sectional units of the whole structure and be readily removed bodily for cleaning or other purposes and be replaced by another frame containing a fresh supply of plates.

The plates 3 may, however, be set up separately.

In Figures 3, 4 and 7, one end of each plate is provided with right-angled extensions 12 of a special profile which, as shown in Fig. 7, ensures that the plates are inserted into the frames in the correct manner, the extension 12 on one plate engaging that end of the next plate which has no such extension. Spacing members or distance pieces 18 in the example illustrated, consist of rings, preferably spring rings. Instead of the annular shape illustrated, the distance pieces may, for example be of polygonal shape or be made in the form of bars (not shown). Also one arrangement for the attachment of retaining rings to the frames can be seen from Figures 1, 2, 7 and 8; 14 is a rod which serves for locking the desired number of plates in position in the frame by means of the retaining ring 17 which is of the same form and size as the distance pieces 18. The rod can, for example, be a circular rod; it can, however, have any desired cross-section. The ends 15, 16 of the rod are preferably of smaller diameter than the rest of the rod. By means of these ends, a rod is inserted in holes in opposite walls of the frame. For use in connection with the locking rod, the retaining ring 17 is provided with openings through which the rods 14 can be inserted. The connection between the retaining rings and the rods or the securing of the rings on the frame can be effected in various ways.

In the drawings, only the retaining ring 17 with its rod 14 which lies on the last plate of each frame is shown, while the distance pieces lying between the plates are only indicated. If the rod 14 is inserted in the right hand hole on one side of the frame, it engages in the left hand hole in the opposite wall which is so located that the inclined position shown is taken up. By this means, if necessary,

the ends of the rods can project into corresponding holes in the walls of the adjacent frame.

5 The apparatus in accordance with the present invention, is distinguished by low cost of manufacture and by the property that it can be easily cleansed. The separate plates of the apparatus can, if desired, be easily coated with zinc, which  
10 presents a difficulty in apparatus having a large number of small filling bodies. Further, owing to the simple manner of cleansing the plates, the recovery of the particles separated out and adhering to  
15 the plates mixed with the moistening liquid can be easily effected.

The baffle plates 3 being each constituted by a single element of simple construction can be easily handled in the  
20 assembly and dismounting.

The passages for the flow remain of uniform size even after long use while the vibration during operation of the device is not only harmless but, on the  
25 contrary, has the effect of loosening the material separated out and this effect becomes greater the more heavily the apparatus is loaded.

While the invention relates to apparatus for the separation of suspended  
30 particles from gases, or vapours, it is particularly applicable for the separation or recovery of dust, for the separation of water and oil from steam, for the condensation of steam, and like operations.

40 Having now particularly described and ascertained the nature of my said invention and in what manner the same is to be performed, I declare that what I claim is:—

1. A filter apparatus for separating suspended matter from gases or vapours comprising a plurality of corrugated

baffle plates arranged in staggered relation to one another, one side wall of each  
45 corrugation being perforated so that the gas or vapour which is to be treated flows through the perforations and strikes the other side wall of the corrugations and deposits the suspended matter within the  
50 trough of the corrugation.

2. A filter apparatus as claimed in Claim 1, in which a plurality of baffle plates is assembled in a frame to form an unitary structure, as many frames as  
55 desired then being joined together to form the complete apparatus.

3. A filter apparatus as claimed in Claim 2 in which the baffle plates are so shaped as to ensure their being assembled  
60 in the correct sequence in the frames.

4. A filter apparatus as claimed in Claim 2, in which distance pieces consisting of annular or polygonal rings are located between the baffle plates.  
65

5. A filter apparatus as claimed in Claim 4, in which the distance rings are locked in position by means of rods which pass through the rings and are located  
70 within holes in the frames.

6. Corrugated baffle plates for a filter apparatus for separating suspended particles from gases or vapours, in which the plates have perforations in one side wall of each corrugation constructed substantially  
75 as described with reference to Figures 3, 4, 5, or 6 of the drawings.

7. A filter apparatus for separating suspended matter from gases or vapours, constructed arranged and operating substantially as described with reference to  
80 the drawings.

Dated this 23rd day of September, 1921.

JOHN GRAY,

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## ERRATUM.

SPECIFICATION No. 169,458.

Page 1, line 5, for "Bangesellschaft"  
read "Baugesellschaft"

PATENT OFFICE,

February 23rd, 1923.

Fig. 1.

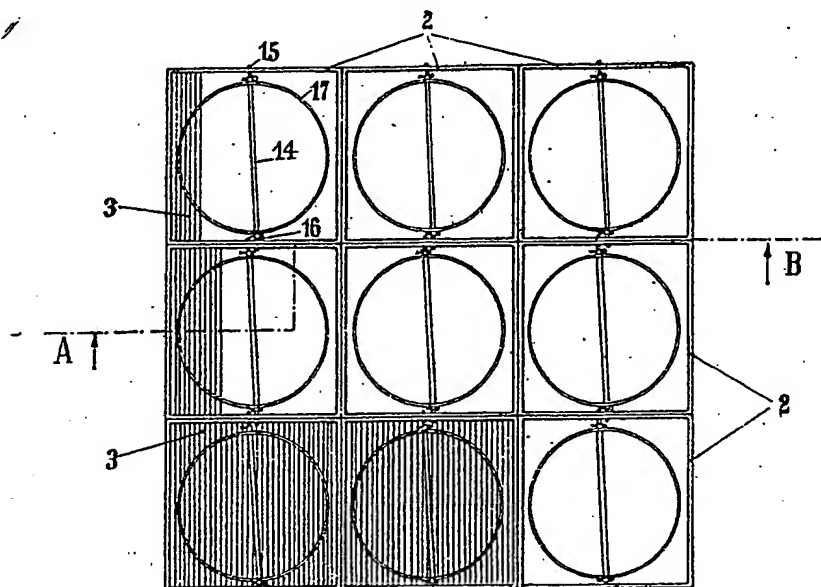


Fig. 2.

A—B

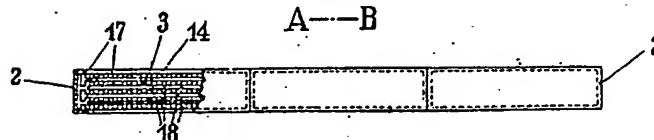


Fig. 3.

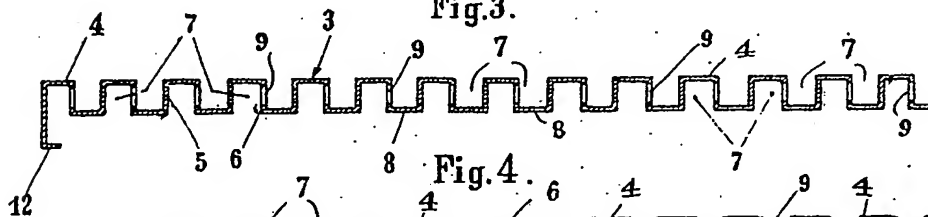
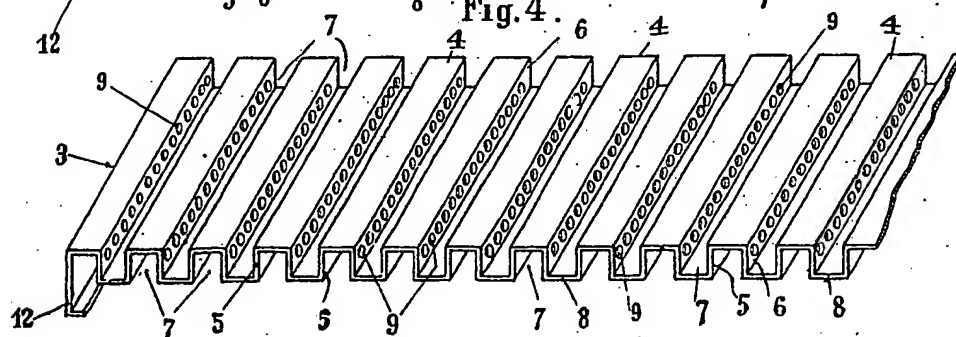


Fig. 4.



[This Drawing is a reproduction of the Original on a reduced scale]

Fig. 5.

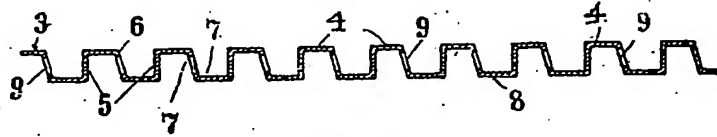


Fig. 6.

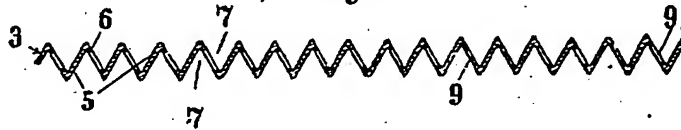


Fig. 7.

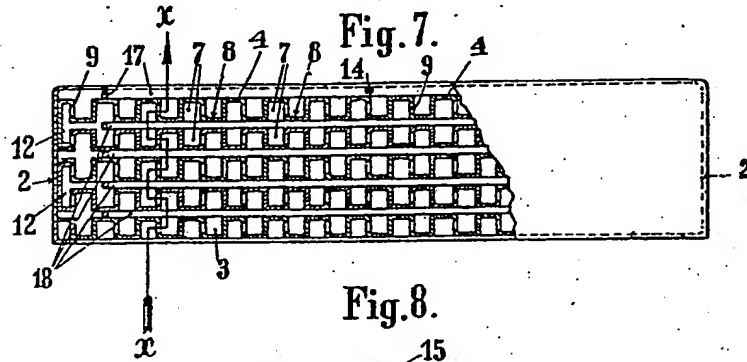
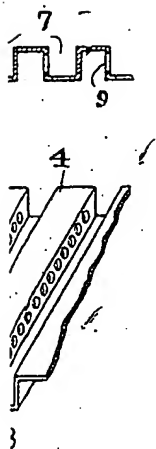
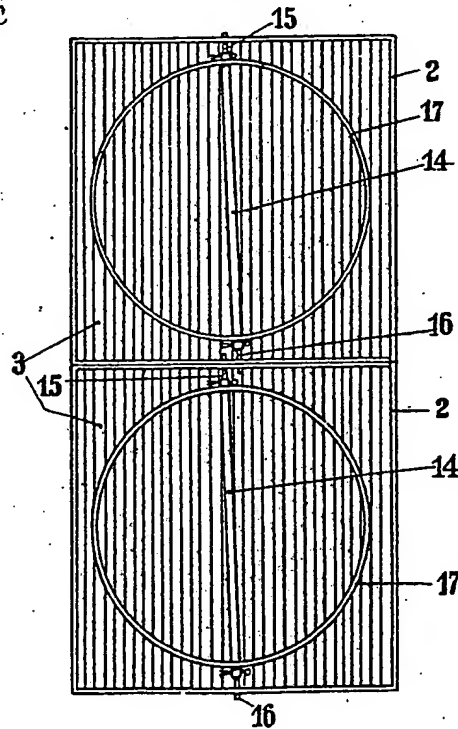


Fig. 8.



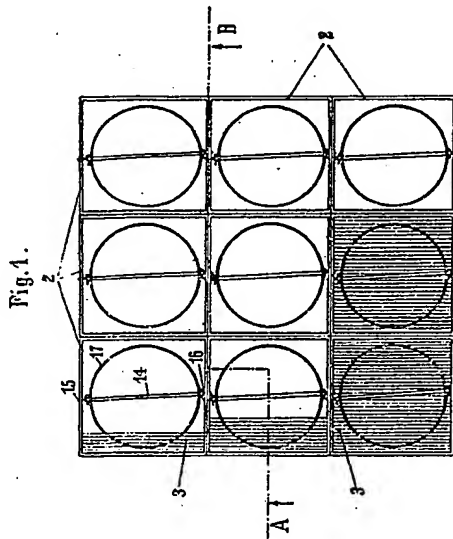


Fig. 1.

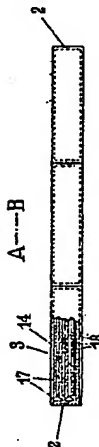


Fig. 2.

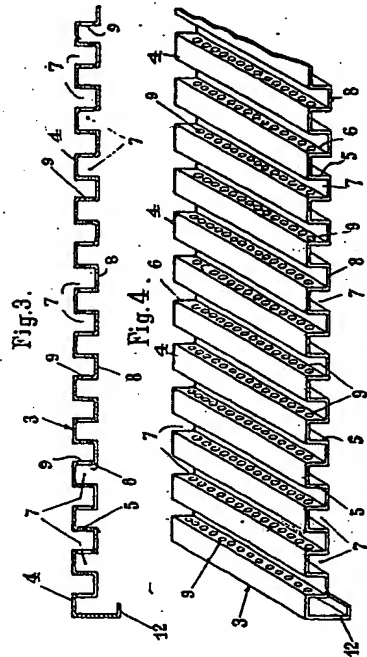


Fig. 3.

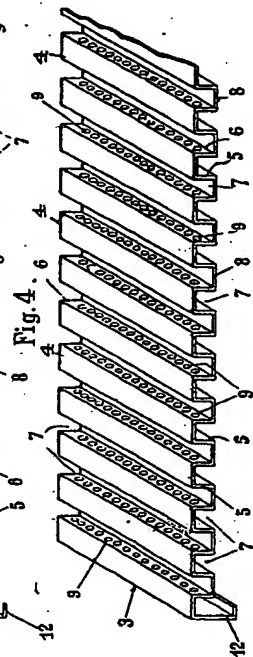


Fig. 4.

Fig. 5.

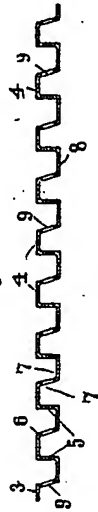


Fig. 6.



Fig. 7.

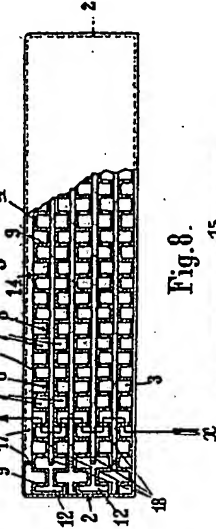
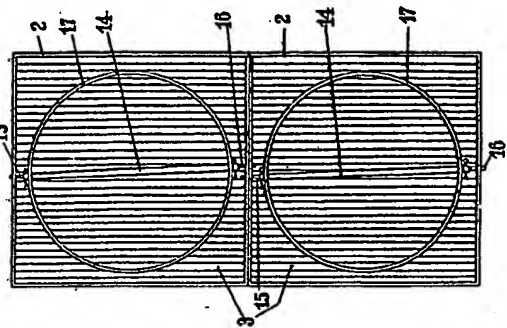


Fig. 8.



[This Drawing is a reproduction of the Original on a reduced scale]